WHAT IS CLAIMED IS:

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1. A single-mode optical transmission fiber for use in a wavelength-division-multiplexing transmission system having carrier wavelengths in an extended wavelength range, the fiber comprising:

a glass core including:

an inner core having a first refractive-index difference;

a first layer radially surrounding the inner core along the length of the fiber and having a second refractive-index difference of less than zero,

a second layer radially surrounding the first layer along the length of the fiber and having a third refractive-index difference,

a third layer radially surrounding the second layer along the length of the fiber and having a fourth refractive-index difference of greater than zero; and

a glass cladding surrounding the glass core and having a refractive-index difference substantially equal to zero,

wherein the fiber has a dispersion slope less than about 0.07 ps/nm²/km over the extended wavelength range,

characterized in that said third refractive-index difference is, in absolute value, less than 40% of said second refractive-index difference.

2. The fiber of claim 1, wherein said third refractive-index difference is, in absolute value, less than 20% of said second refractive-index difference.

3. The fiber of claim 2, wherein said third refractive-index difference is substantially zero.

4. The fiber according to at least one of claims 1-3, wherein said second layer has a width in the range 1 - 5 μm.

5. The fiber of claim 4, wherein said second layer has a width in the range 2 - 4 μm.

6. The fiber according to at least one of claims 1-5, further comprising a

fourth layer radially surrounding the third layer along the length of the fiber and having a fifth refractive-index difference of less than zero.

7. The fiber according to at least one of claims 1-6, wherein the first refractive-index difference of the inner core exceeds the fourth refractive-index difference of the third layer.

8. The fiber according to at least one of claims 1-6, wherein the fourth refractive-index difference of the third layer exceeds the first refractive-index difference of the inner core.

9. The fiber according to at least one of claims 1-8, wherein the fiber has a dispersion slope less than about 0.05 ps/nm^2/km over the extended wavelength range.

10. The fiber according to at least one of claims 1-9, wherein the fiber has a dispersion value of at least 1.5 ps/nm/km over the extended wavelength range.

11. The fiber of claim 10, wherein the dispersion value ranges from about 1.5-12 ps/nm/km across the extended wavelength range.

12. The fiber according to at least one of claims 1-11, wherein the extended wavelength range is between about 1530 and 1650 nm.

13. The fiber of claim 12, wherein the fiber has a dispersion slope less than or equal to 0.043 ps/nm^2/km at a wavelength of 1550 nm.

14. The fiber according to at least one of claims 12-13, wherein the fiber has a zero-dispersion wavelength of less than about 1500 nm.

15. The fiber of claim 14, wherein the fiber has a zero-dispersion wavelength of less than about 1480 nm.

16. The fiber according to at least one of claims 1-11, wherein the

extended wavelength range is between about 1450 and 1650 nm.

17. The fiber of claim 16, wherein the fiber has a dispersion slope less than or equal to 0.046 ps/nm^2/km at a wavelength of 1550 nm.

18. The fiber according to at least one of claims 16-17, wherein the fiber has a zero-dispersion wavelength of less than about 1450 nm.

19. The fiber according to at least one of claims 1-18, wherein the fiber has an effective area of greater than 50 μm^2.

20. The fiber according to claim 19, wherein the fiber has an effective area of about 55 μm^2.

21. A single-mode optical transmission fiber, comprising:

a glass core having a central cross-sectional area with a first refractive-index peak, an outside ring with a second refractive-index peak higher than the first peak, a first intermediate region between the two peaks having a low-dopant content, and a second intermediate region between the first peak and the first intermediate region with a refractive-index depression lower than the first intermediate region; and

a glass cladding surrounding the glass core, wherein the fiber has a dispersion slope of less than about 0.05 ps/nm^2/km over a wavelength range of about 1530-1650 nm.

22. The fiber of claim 21, further comprising a layer radially surrounding the outside ring and having a depressed refractive-index difference.

23. The fiber according to at least one of claims 21-22 wherein the fiber has a dispersion value of at least 1.5 ps/nm/km over a wavelength range of about 1530-1650 nm.

24. The fiber of claim 23 wherein the fiber has a zero-dispersion wavelength of less than 1500 nm.

25. The fiber of claim 24 wherein the fiber has a zero-dispersion wavelength of less than about 1480 nm.

26. The fiber according to at least one of claims 21-22 wherein the fiber has a dispersion slope of less than about 0.05 ps/nm²/km over a wavelength range of about 1450-1650 nm.

27. The fiber of claim 26, wherein the fiber has a zero-dispersion wavelength of less than about 1450 nm.

28. The fiber according to at least one of claims 21-27, wherein the fiber has an effective area of greater than 50 μm^2.

29. The fiber according to claim 28 wherein the fiber has an effective area of about 55 μm^2.

30. A method for producing a single-mode optical fiber for use in a wavelength-division-multiplexing transmission system having carrier wavelengths in an extended wavelength range, comprising:

producing a preform having

an inner core region with a first refractive-index difference;

a first layer radially surrounding the inner core region along the length of the preform and having a second refractive-index difference of less than zero,

a second layer radially surrounding the first layer along the length of the preform and having a third refractive-index difference,

a third layer radially surrounding the second layer along the length of the preform and having a fourth refractive-index difference of greater than zero; and

a glass cladding layer surrounding the core region and having a refractive-index difference substantially equal to zero; and

drawing said preform,

characterized in that the step of producing a preform comprises:

- selecting said third refractive-index difference to be, in absolute value, less than 40% of said second refractive-index difference;

- selecting a width of said second layer in the preform so that a corresponding layer in the drawn fiber has a width in the range 1 - 5 μm.

31. The method of claim 30, wherein said third refractive-index difference is selected to be, in absolute value, less than 20% of said second refractive-index difference.

32. The method according to at least one of claims 30-31, wherein the step of producing a preform comprises selecting a width of said second layer in the preform so that a corresponding layer in the drawn fiber has a width in the range 2 - 4 μm.

33. The method according to at least one of claims 30-32, comprising selecting the widths of said inner core region and of said first, second and third layer and selecting said first, second, third and fourth refractive index differences so that the dispersion slope of the drawn fiber is less than or equal to 0.046 ps/nm^2/km at a wavelength of 1550 nm.

34. The method of claim 33, comprising selecting the widths of said inner core region and of said first, second and third layer and selecting said first, second, third and fourth refractive index differences so that the dispersion slope of the drawn fiber is less than or equal to 0.043 ps/nm^2/km at a wavelength of 1550 nm.